LOUISIANA POWER & LIGHT / WATERFORD 3 SES • P.O. BOX B • KILLONA, LA 70066-0751

MIDDLE SOUTH UTILITIES SYSTEM

W3A90-0104
A4.05
QA

January 19, 1990

U.S. Nuclear Regulatory Commission
ATTENTION: Document Control Desk
Washington, D.C. 20555

SUBJECT: Waterford 3 SES
Docket No. 50-382
License No. NPF-38
Reporting of Licensee Event Report

Attached is Licensee Event Report Number LER-89-023-00 for Waterford Steam Electric Station Unit 3. This Licensee Event Report is submitted voluntarily as an item of potential interest to the NRC Staff.

Very truly yours,

J.R. McGaha
Plant Manager - Nuclear

JRM/JEF/rk
Attachment

cc: Messrs. R.D. Martin
J.T. Wheelock - INPO Records Center
E.L. Blake
W.M. Stevenson
D.L. Wigginton
NRC Resident Inspectors

IE22
1/1

NRC Form 366 (9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Waterford Steam Electric Station Unit 3	0 5 0 0 0 3 8 2	1 OF 0 4

TITLE (4)

Fatigue Failure of The Main Steam Isolation Valve Stem Due To Cyclic Stress

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)
									N/A	0 5 0 0 0
0 9	2 7	8 9	8 9	0 2 3	0 0	0 1	1 9	9 0	N/A	0 5 0 0 0

OPERATING MODE (9)	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
6	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10): 0 0 0	20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
	20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	X OTHER (Specify in Abstract below and in Text, NRC Form 366A)
	20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
	20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
	20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER: AREA CODE	
John B. Houghtaling - MSIV Project Manager	5 0 4	7 3 9 - 6 4 8 5

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	
B	S B	I S V	W 2 5 5	Y							
B	C B	I S V	W 2 5 5	Y							

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	X NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

On September 27, 1989, with Waterford Steam Electric Station Unit 3 shutdown for a refueling outage, Main Steam Isolation Valve 2 (MSIV) MS-124B, was determined to have a broken stem. MSIV 1, MS-124A, was disassembled and a crack was identified at the same location as that found in MSIV 2. The root cause of this event is fatigue failure of the stem. The MSIVs have been subsequently repaired. MSIV 1 and 2 previously experienced guide rail failures in April of 1988.

Other design problems have been noted on W-K-M POW-R-SEAL gate valves at Waterford 3. An evaluation of similar valves manufactured by W-K-M is being conducted to determine the need for further replacement. Although these events appeared to be individual isolated cases and do not meet the reporting criteria of 10CFR50.73(a), the combined problems are being reported as a voluntary LER which may be of generic interest to the nuclear industry.

The MSIVs would have closed in less than three seconds on a Main Steam Isolation Signal, for both failures, thus the nuclear safety function of this valve was not impacted and no threat to the health and safety of the public or plant staff existed.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Waterford Steam Electric Station Unit 3	0 5 0 0 0 3 8 2	8 9	— 0 2 3	— 0 0	0 2 OF 0 4

TEXT (If more space is required, use additional NRC Form 366A's) (17)

On September 27, 1989, while shutdown for refueling outage 3, Main Steam Isolation Valve 2 (MSIV) MS124B (EIIS Identifier SB-ISV) stem was found to have broken at the stem/stem head connection. Subsequent inspection of MSIV 1 revealed a crack in the same location as the failure in MSIV 2. The MSIVs are thirty inch POW-R-SEAL parallel expanding gate valves manufactured by W-K-M Product Division of Cooper Industries.

The root cause for the MSIV stem failure was MSIV hydraulic control unit (HCU) (EIIS Identifier HCU) thermal relief valve (EIIS Identifier RV) leakage. This leakage led to excessive HCU pump cycling and degradation of the hydraulic system components over the last year. These frequent hydraulic pressure fluctuations caused eccentric loading of the MSIV stem head and subsequent fatigue failure of the MSIV stem. A contributing cause was the small radius area of the stem/stem head connection which increased the nominal stress at the fracture location.

The following actions have been or will be taken:

- Replacement MSIV stems with increased blend radius designed to decrease peak stress in the failure region have been installed.

- The MSIV HCUs were overhauled to minimize cycling of the MSIV stem.

- Cumulative cycle meters to record HCU pump cycles were installed to provide indication of gradual system degradation.

- A new MSIV stem designed to increase the fatigue lifetime of the valve stem is under evaluation. This will include a long term inspection program to ensure valve stem integrity. The new stem design should be completed by March 30, 1990.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Waterford Steam Electric Station Unit 3	0 5 0 0 0 3 8 2	8 9	— 0 2 3	— 0 0	0 3 OF 0 4

TEXT (If more space is required, use additional NRC Form 366A's) (17)

- The MSIV surveillance procedure is being evaluated to decrease the loads applied to the stem during non-emergency valve actuations and should be revised by April 30, 1991. (completion of refuel 4)

- A detailed evaluation is being completed and should be provided to the NRC resident inspector by February 28, 1990.

  NOTE: Preliminary calculations indicate the MSIV stems are acceptable through the next two fuel cycles.

Separation of the stem from the gate end of the stem would not impact closing of the valve because these two separated parts remain aligned. The MSIV would have closed in less than three seconds on a Main Steam Isolation Signal thus the nuclear safety function of this valve was not impacted; therefore, no threat to the health and safety of the public or plant staff existed.

In April 1988, the gate guide rails for MSIV 1 and 2 failed. The root cause was material galling resulting in excessive friction and eventual failure of the guide rail bolts. A number of design enhancements were implemented to correct this problem.

Design inadequacies have been noted on other POW-R-SEAL gate valves manufactured by W-K-M but none required reporting per 10CFR50.73 or 10CFR21. The letdown system containment inside isolation valve, CVC-103, (EIIS Identifier - CB-ISV) failed to close on February 21, 1985, March 25, 1985, and June 1, 1985. The outside isolation valve, CVC-109, failed to close on April 14, 1988, and October 23, 1988. These problems were noted during routine system testing. Both of these were W-K-M 2 inch POW-R-SEAL air opened spring closed reverse seated gate valves. The root cause of four of the failures was thermal binding between the valve body and the segment/gate. When directed to close, there was insufficient force by the spring actuator to move the segment/gate assembly. One failure was attributed to a manufacturing defect in the operator spring. CVC-103 and CVC-109 were replaced with Masoneilan Model 48-20761 globe valves in July 1985 and October 1988 respectively. System Engineering is evaluating W-K-M valves and other plant system valves with the same service characteristics as the MSIVs. This evaluation is planned to be completed by June 30, 1990.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Waterford Steam Electric Station Unit 3	0 5 0 0 0 3 8 2	8 9	— 0 2 3	— 0 0	0 4 OF 0 4

TEXT *(If more space is required, use additional NRC Form 366A's)* (17)

Each component failure identified in this report was documented and evaluated under the Waterford 3 Potentially Reportable Event (PRE) Program. Each of these events were single independent component failures and a redundant component was available to fulfill the system safety function; therefore, no threat to the health and safety of the public or plant staff existed. Because of the number of problems experienced with W-K-M POW-R-SEAL type valves at Waterford 3, this voluntary LER is being issued for general interest.

SIMILAR EVENTS

No similar events of this nature have been reported by Waterford 3. The specific details of each of the events described in this LER are available in the following files at Waterford 3.

- o MSIV 2 Stem Failure — PRE 89-103
- o MSIV Guide Rail Failure — PRE 88-038
- o CVC 109 Failure — PRE 88-051 and 88-102
- o CVC 103 Failure — PRE 85-054, 85-073 and 85-113

PLANT CONTACT

John B. Houghtaling, MSIV Project Manager, 504-739-6485.